# Federal Democratic Republic of Ethiopia

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ET 471 (2000) (English): SEED - SAMPLING

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# ETHIOPIAN STANDARD

# ES 471:2000

(Reaffirmed :2012)

**First edition**

# Seed - Sampling

ICS: 65.020.20

Published by Ethiopian Standards Agency

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## Foreword

This Ethiopian Standard has been prepared under the direction of Technical Committee for seeds (TC 16) and published by the Ethiopian Standards Agency (ESA).
The technical contents in the text of this Standard are identical with ES 471:2000 edition while the reissued standard carries some editorial and technical changes observed in the course of systematic review.

Acknowledgement has been made for the use of the indicated publication.

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# Seed — Sampling

## 1 Scope

This Ethiopian Standard specifies the method for obtaining a sample of seed sizes suitable for tests, in which the same constituents are present as in the seed lot and in the same proportions.

## 2 Normative references

The following standard contain provision which, through reference in this text, constitute provision of this Ethiopian Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this Ethiopian Standard are encouraged to investigate the possibility of applying the most recent editions of the Ethiopian Standards indicated below. Registers of currently valid standards are maintained in the Quality and Standards Authority of Ethiopia.

ES 413:2000, *Seeds – Terminology*.

ES 471:2000, *Seeds – Sampling.*

ES 472:2000*, Seeds – Purity analysis.*

ES 473:2000*, Seeds – Determination of other seed crops.*

ES 474:2000*, Seeds – Germination test.*

ES 475:2000*, Seeds – Biochemical test for viability.*

ES 476:2000*, Seeds – Determination of seed health.*

ES 477:2000, *Seeds – Verification of species and cultivars*.

ES 478:2000*, Seeds – Determination of moisture content.*

## 3 Definitions

For the purpose of this standard, the definitions in ES 413 and the following shall apply.

**3.1**
**consignment**
the quantity of seed received or despatched at one time

**3.2**
**lot**
a specified quantity of seed sample of one cultivar, of known origin and history, and controlled under one reference number

**3.3**
**primary Sample**
a small portion of seed taken from one part of a seed lot

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**3.4**
**composite or bulk sample**
the quantity of seeds formed by combining and mixing all the primary samples taken from the different parts of the seed lot

**3.5**
**submitted Sample**
is the quantity of seed sample obtained by reducing the composite or bulk sample, which shall be submitted to the testing station

**3.6**
**working sample**
a reduced sample taken from the submitted sample in the laboratory, on which one of the quality tests described in the following standards shall be made.

## 4 Principles

A sample shall be obtained from the seed lot by taking small portions at random from different positions in the lot and combining them. From this sample, smaller samples shall be obtained by one or more stages. At each stage, thorough mixing shall be followed either by progressive sub-division or by the abstraction and combination of small portions at random.

## 5 Apparatus

Each stage in sampling the lot shall be performed using appropriate techniques and equipment. The following apparatus are used for drawing primary samples and for the preparation of submitted and working samples in the laboratories.

a) Stick or sleeve trier or bin sampler ;

b) Nobbe or spear trier ;

c) Hand held Instruments ;

d) Mechanical divider; and

e) Random sample cups etc.

## 6 Requirements

### 6.1 General

#### 6.1.1 Size of seed lot

a) A consignment of seed in excess of the prescribed quantity shall be sub-divided into lots not larger than the prescribed quantity, each of which shall be identified by a separate lot designation.

b) A seed lot shall not exceed the quantity indicated in Table 3 and is subject to a tolerance of 5%.

### 6.2 Uniformity of the lot

A seed lot shall be as uniform as is practicable and shall not, at the sampling operation, show evidence of heterogeneity.

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## 6.3 Containers

The lot shall be in bags or other containers, which are self-sealing, (or capable of being sealed) and labelled or marked for identification by a single lot designation.

## 6.4 Marking and sealing of a lot

**6.4.1** At the time of sampling, all containers must be labelled or marked to show a a lot identification. The lot identification must be approved or allotted by the seed testing station concerned.

**6.4.2** The containers shall be sealed, or seen to be sealed, by the sampler. A container shall be regarded as sealed if it is apparently impossible to open without either destroying the seal or leaving evidence of tampering. If the containers are not of an approved self-sealing type there shall be affixed to each container, under the control of the sampler, an officially recognized seal, or indelible mark, or non-removable label. No sampled lot, or part of a lot, shall be left unsealed.

# 7 Procedure

**7.1** Sampling shall be carried out only be persons trained and experienced in seed sampling, and, either recognized individually by the seed testing station concerned, or employed by other official or semi-official organizations recognized by the head of the station for this purpose.

**7.2** The seed lot shall be so arranged that each individual container or part of the lot is conveniently accessible upon request by the sampler, the owner shall provide full information regarding the bulking and mixing of the lot. When there is definite evidence of heterogeneity, either physical or documentary sampling shall be refused.

## 7.1 Sampling Intensity

**7.3.1** For seed lots in bags (or other containers of similar capacity that are of uniform in size, the following sampling intensity shall be regarded as the minimum requirements:

**Table 1 – Minimum seed sampling requirements for seeds in bags**

| Lot Size | Number of Primary Samples to be Taken |
|---|---|
| Up to 5 containers | Sample each container and always take at least five primary samples. |
| 6-30 containers | Sample at least one in every five containers, or whichever is greater. |
| 31-400 containers | Sample 10 containers or at least one in every five containers, which ever is greater. |
| 400 containers or more | Sample 80 containers or at least one in every seven containers, which ever is greater. |

**7.3.2** When sampling seed containers of different sizes, or from streams of seed entering containers the following sampling intensity shall be regarded as the minimum requirement:

**Table 2 – Minimum seed sampling requirements for seed lots in bulk or from streams of seeds entering containers**

| **Lot Size in/kg** | **Number of Primary Samples to be Taken** |
|---|---|
| Up to 500 | At least five primary samples, |
| 501-3, 000 | One primary sample for each 300 kg., but not less than 5 |
| 3001-20,000 | One primary sample for each 500 kg, but not less than 10. |
| 21,000 and above | One primary sample for each 700 kg, but not less than 40 |

**7.3.3** Sampling intensity for small containers

If the seed is in small containers such as tins, cartons, or packets as used in the retail trade, the following procedure is recommended.

A 100 kg weight of seed is taken as the basic unit and the small containers are combined to form sampling units not exceeding this weight of 20 containers of 5 kg, 33 containers of 3 kg or 100 containers of 1 kg. For sampling purposes, each unit is regarded as one container.

## 7.4 Weight of submitted sample

Minimum weights of submitted samples are as follows:

### 7.4.1 For determination of moisture content

a) 100 g for species that have to be ground; and

b) 50 g shall be taken for all other species and determined in accordance with ES 472.

### 7.4.2 For verification of species and cultivars

The species and cultivars of a submitted sample shall be determined in accordance with ES 472.

**7.4.3** All other tests purity, other seeds, germination, biochemical and seed health/ shall be determined in accordance with the weights of lots and samples of agricultural and horticultural seeds indicated in column 3 of table 3.

Each sample size is derived from a nominal 1000 seed weight for each species which in the available evidence is expected to be adequate for the major samples used.

In case the submitted sample is smaller than the required, the sampler shall be notified accordingly and the analysis with-held until sufficient seed is received; except that in the case of very expensive seed, the analysis may be completed to the extent possible and the following statement inserted on the report "The sample submitted weighed only, and is not in accordance with the prescribed standard.

### 7.5 Taking primary samples

**7.5.1** Primary samples of approximately equal size shall be taken from each container sampled or from each place sampled in such container, or from each location sampled in a bulk.

**7.5.2** When the lot is in containers (including bags), the containers to be sampled shall be selected at random throughout the lot and primary samples drawn from top, middle and bottom of containers, but not necessarily from more than one position in any container.

**7.5.3** When the seed is in bulk or in large containers, the primary samples shall be drawn from random positions and depths.

**7.5.4** In the case of chaffy seeds that have not been rendered free-flowing, the primary samples may be drawn by hand.

**7.5.5** When seed is to be packed in small or moisture-proof containers (e.g. tins or plastic bags), it should, if possible be sampled before the seed enters the containers. When this has not been done, a sufficient number of containers shall be opened or pierced for abstraction of primary samples.The sampled containers shall then be closed or the contents transferred to new containers.

**7.5.6** Seed may be sampled as it enters the containers, provided that the instrument uniformly samples the cross section of the seed stream and seeds entering the instrument do not bounce out again; it may be operated either under manual or automatic control.

### 7.6 Obtaining composite sample

If the primary samples appear uniform they shall be combined mixed to form the composite or bulk sample.

### 7.7 Obtaining the submitted sample

**7.7.1** The submitted sample shall be obtained by reducing the composite or bulk sample to an appropriate size as in clause 9.2 using larger equipment if necessary.

**7.7.2** If it is difficult to mix and reduce the sample properly under warehouse conditions, the entire composite sample shall be forwarded to the seed testing station for reduction.

**7.7.3** If the composite sample is of appropriate size it may be regarded as the submitted sample without reduction.

**7.7.4** Additional samples requested not later than at the time of sampling, by the owner of the lot, if granted, shall be prepared in the same way as the submitted sample and marked "Duplicate".

## 8 Dispatch of submitted sample

**8.1** Each submitted sample shall be marked and labelled in a way that establishes the connection between the seed lot and sample.

**8.1.1** Sample shall be packed so as to prevent damage during transit, samples shall be packed in moisture proof containers only for the determination of moisture content or when the seed lot itself has been dried to low moisture content and is for germination tests, shall not be packed in moisture-proof containers; only the determination of moisture content, packed in moisture proof containers from which as much air as possible has been excluded.

**8.1.2** Samples shall be dispatched by the sampler to the seed testing station without delay and shall never be left in the hands of the sampler owner, applicant, or other persons not authorised by the sampling agency or by the seed testing station. Where the seed has been chemically treated the name of the treatment shall be given to the seed testing laboratory as well.

## 9 Procedure in the laboratory

The submitted sample is allocated a reference number in the register, which is used to identify all working samples drawn from the submitted sample.

### 9.1 Minimum weight of working sample

Minimum weights of working samples shall be as indicated in table 3 herein.

### 9.2 Obtaining the working sample

**9.2.1** The submitted sample received by the seed testing station generally needs to be reduced to a working sample equal to or greater than the weight prescribed for each test.

**9.2.2** The submitted sample shall first be thoroughly mixed. The working sample shall then be obtained either by repeated halving or by abstracting and subsequently combining small random portions.

**9.2.3** Duplicate samples shall be drawn independently; after drawing the first working sample or half-working sample the remainder of the submitted sample shall be remixed before the second sample or half-sample is drawn.

## 10 Storage of samples

### 10.1 Before testing

Every effort must be made to start testing on the day of receipt. If delay is unavoidable, the sample shall be stored in a cool well-ventilated room in such a way that changes in the quality of the seed are minimized.

### 10.2 After Testing

**10.2.1** To provide re-testing by the original or by another testing stations, submitted samples shall be stored for one year after the set of the first tests in conditions calculated to minimize any change in quality. Nevertheless, the testing station shall not be held responsible for any deterioration that occurs.

**10.2.2** When a re-test is required, a portion shall be drawn from the submitted sample in accordance with clause 9.2 sealed and submitted to the designated testing station. The remainder shall be retained in store.

**Table 3 – Agricultural and horticultural seed lots and sample weights**

| | **Species Latin name** | **Common name** | Maximum Weight of Lot, Kg. | **Minimum Sample Weights** | | |
|---|---|---|---|---|---|---|
| **Ser. no.** | 1<br>1 | 2 | 3 | Submitted Sample,g 4 | Working Sample for Purity Analysis g, 5 | Working Sample for Count of Other Species g, 6 |
| 1 | Allium cepa L. | onion | 10,000 | 80 | 8 | 80 |
| 2 | Allium porrum L | leek | 10,000 | 70 | 7 | 70 |
| 3 | Arachis hypogaea L. | ground nut | 20,000 | 1,000 | 1,000 | 1,000 |
| 4 | Asparagus officinal is L | Asparagus | 20,000 | 1,000 | 100 | 1,000 |
| 5 | Avena sativa L | Oat | 20,000 | 1,000 | 120 | 1,000 |
| 6 | Beta vulgaris L. (all vars) | beet | 20,000 | 500 | 50 | 500 |
| 7 | Brassica chinensis L | Chinese cabbage | 10,000 | 40 | 4 | 40 |
| 8 | Brassica integrifolia | - | 10,000 | - | - | - |
| 9 | Brassica Juncea (L) Czern et. | Leaf mustard | 10,000 | 40 | 4 | 40 |
| 10 | casson in Czern | mustard | 10,000 | 40 | 4 | 40 |
| 11 | Brassica nigra (L) W. Koch | Brussels sprout | 10,000 | 100 | 10 | 100 |
| 12 | Brassica oleracea L. (all vars) | cabbage | 10,000 | 100 | 10 | 100 |
| 13 | Brassica botrytis | - | 10,000 | 70 | 7 | 70 |
| 14 | Brassica Carinata brown | mustard | 10,000 | 70 | 7 | 70 |
| 15 | Brassica napus L. | rape seed | 20,000 | 1,000 | 300 | 1,000 |
| 16 | Cajanus cajan (L) nuth | pigeon pea | 10,000 | 150 | 15 | 150 |
| 17 | Capsicum species | Pepper | 10,000 | 150 | 15 | 150 |
| 18 | Capsicum minimum | - | 10,000 | 900 | 90 | 900 |
| 19 | Carthamus tinctorius L | Saff flower | 10,000 | 25 | 1 | 10 |
| 20 | Chloris gayana Runth | Rhodes grass | 20,000 | 1,000 | 1,000 | 1,000 |
| 21 | Cicer arietinum L. | chick pea | 10,000 | 150 | 70 | 150 |
| 22 | Cucumis melo L. | musk melon | 10,000 | 150 | 70 | 150 |
| 23 | Cucumis Sativus L | cucumber | 20,000 | 1,000 | 700 | 1,000 |
| 24 | Cucurbita maxima Duch | winter squash | 10,000 | 350 | 180 | 350 |
| | C. moschata (duch) | pumpkin | | | | |
| | Duch expoir | | | | | |
| 25 | C. Pepo L. | Zvcchini marrow squash | 20,000 | 1,000 | 700 | 1,000 |
| 26 | Dactylis glomerats L.L | Cosksgoat orchard grass | 10,000 | 30 | 3 | 30 |

**Table 3 – Continued**

| Ser. | Specie Latin name | Common name | Maximum | Minimum Sample Weights | | |
|---|---|---|---|---|---|---|
| no. | | | weight of Lot kg | Submitted Sample /g | Working Sample for Purity Analysis /g | Working Sample for Count of Other Species /g |
| 27 | Daucus carota L | carrot | 10,000 | 300 | 3 | 30 |
| 28 | Dollichos lablab L | olichos bean | 20,000 | 1,000 | 500 | 1,000 |
| 29 | (Lablab purpureus (L) Sweet) | lablab | 20,000 | 1,000 | 500 | 1,000 |
| 30 | Eragrostis teff | teff | 10,000 | 25 | 1 | 10 |
| 31 | Glycine max (L) Merrill | Soya bean | 20,000 | 1,000 | 200 | 1,000 |
| 32 | Gossypium spp. | cotton | 20,000 | 1,000 | 350 | 1,000 |
| 33 | Guizetia abyssinica | Noug | 10,000 | 70 | 7 | 70 |
| 34 | Helianthus annuus L. | Sunflower | 20,000 | 1,000 | 200 | 1,000 |
| 35 | Hibiscus esculentus L. | Okra | 20,000 | 1,000 | 140 | 1,000 |
| 36 | Hordeum vulgare L. | Barley | 20,000 | 1,000 | 140 | 1,000 |
| 37 | Lactuca sativa L. | Lettuce | 10,000 | 30 | 3 | 30 |
| 38 | Lathyrus sativus | Grass pea | 10,000 | 700 | 70 | 700 |
| 39 | Lens culinaris Medik us L.<br>L. esculenta Moench | Lentil | 10,000 | 600 | 60 | 600 |
| 40 | Linum usitatissimum L. | Flax | 10,000 | 150 | 15 | 150 |
| 41 | Lolium multiforum Lam. | Italian rye grass | 10,000 | 60 | 6 | 60 |
| 42 | Lupinus albus L. | Lupin | 20,000 | 1,000 | 450 | 1,000 |
| 43 | Lupinus angustifolius L. | Lupin | 20,000 | 1,000 | 450 | 1,000 |
| 44 | Lupinus luteus L. | Yellow lupine | 20,000 | 1,000 | 450 | 1,000 |
| 45 | Lycopersicom esculentum L mill<br>Karsten extfarwell | Tomato | 10,000 | 15 | 7 | 15 |
| 46 | = Solanum Lycopersicum L | - | 10,700 | 70 | 7 | 70 |
| 47 | Medicago polymorpha L.= | - | 10,000 | 70 | 7 | 70 |
| 48 | Medicago hispida Gaerth | Lucerne | 10,000 | 50 | 5 | 50 |
| 49 | Medicago sativa L | Tobacco | 10,000 | 25 | 0.5 | 5 |
| 50 | Nicotiana tabacum L | - | 10,000 | 40 | 4 | 40 |
| 51 | Ocimum basilicum L | rice | 20,000 | 400 | 40 | 400 |
| 52 | Oryza sativa L. | - | 10,000 | 150 | 15 | 150 |
| 53 | Pennisatum typhoides (Burm.) fil. Stapf<br>Et C.E. Hubb<br>Petroselinum Cirspum (Mill)<br>Nym ex A.W.Hill | - | 10,000 | 40 | 4 | 40 |

**Table 3 – Continued**

| Ser. no. | Species Latin Name | Common name | Maximum Weight of Lot kg. | Minimum Sample Weights | | |
|---|---|---|---|---|---|---|
| | | | | Submitted Sample g | Working Sample for Purity Analysis g | Working Sample for Count of Other Species g |
| 54 | Phaseolus angularis (willd) W weight | - | 200,000 | 150 | 250 | 150 |
| 55 | Phaseolus aureus roxb=Phaseolus radiatus L.Vigna radiata (L) wilex | - | 20,000 | 40 | 120 | 40 |
| 56 | Phaseolus coccineus L | Runner bean | 20,000 | 1,000 | 1,000 | 1,000 |
| 57 | Phaseolus mungo L | Gram, black | 20,000 | 1,000 | 700 | 1,000 |
| 58 | Phascolus lunatus l.<br>Inc. =P. limonsis L | Lima bean | 20,000 | 1,000 | 1,000 | 1,000 |
| 59 | Phaseolus vulgaris L. | Haricot bean | 20,000 | 1,000 | 700 | 1,000 |
| 60 | Pisum sativum L, sens lat | Field pea | 20,000 | 1,000 | 9,000 | 1,000 |
| 61 | Raphanus Sativus L | Fodder radish | 10,000 | 300 | 30 | 300 |
| 62 | Ricinus communis L | Castor bean | 20,000 | 1,000 | 500 | 1,000 |
| 63 | Secale cerale L | raolish | 20,000 | 1,000 | 120 | 1,000 |
| 64 | Sesamum indicum L | Sesame | 10,000 | 70 | 7 | 70 |
| 65 | Setarial italica (L beauv) | - | 10,000 | 90 | 9 | 90 |
| 66 | Sinaps alba L<br>Brassoca alba (L)<br>Rabenth | Mustard | 10,000 | 200 | 20 | 200 |
| 67 | Solanum melongena L | Egg plant | 10,000 | 150 | 15 | 150 |
| 68 | Solanum tuberosum L | Potatoe | 10,000 | 150 | 15 | 150 |
| 69 | Sorghum bicolor (L moench<br>Sorghum vulgare pers. | Sorghum | 10,000 | 900 | 90 | 900 |
| 70 | Sorghum Sudananse<br>(piper) Stapf | Sidam grass | 10,000 | 90 | 9 | 90 |
| 71 | Spinacia Oleracea L. | Spinach | 10,000 | 250 | 25 | 250 |
| 72 | Thymus vulgaris L | - | 10,000 | 25 | 0.5 | 5 |
| 23 | Trifolium campestre schreb.<br>=Trifolium proceum bens L | - | 10,000 | 25 | 0.5 | 5 |
| 74 | Trifolium glomeratum L | - | 10,000 | 25 | 1 | 10 |

**Table 3 – Continued**

| Ser. no. | Species Latin Name | Common name | Maximum Weight of Lot kg. | Minimum Sample Weights | | |
|---|---|---|---|---|---|---|
| | | | | Submitted Sample g | Working Sample for Purity Analysis g | Working Sample for Count of Other Species g |
| 75 | Trifolium hybridum L | Olsike colver | 10,000 | 25 | 1 | 10 |
| | | | | | | 20 |
| 76 | Trifolium incarnatum L | Crimson | 10,000 | 80 | 2 | 80 |
| | | clover | | | | 450 |
| 77 | Trifolium repens L | | 10,000 | 25 | 8 | |
| | | White clover | | | | 1,000 |
| 78 | Trigonella foenum | | 10,000 | 450 | 45 | 1,000 |
| | greacum L | Fenugreek | | | | 1,000 |
| 79 | | | 20,000 | 1,000 | 120 | 1,000 |
| | Triticum aestivum L. | Bread wheat | | | | 1,000 |
| | amend. | | | | | |
| 80 | Fiori et Paoletti | | 20,000 | 1,000 | 120 | |
| | | Durum | | | | 1,000 |
| 81 | Triticum durum Desf | wheat | 20,000 | 1,000 | 1,000 | |
| 82 | Vicia faba L | Faba bean | 20,000 | 1,000 | 1,000 | |
| 83 | Vicia dasicarpa L. | Vetch | 20,000 | 1,000 | 400 | |
| | Vigna unguiculata (L. | Cow pea | | | | |
| | Walpers = | | | | | |
| 84 | Vigna Sinensis L. Saviex | | 20,000 | 1,000 | 900 | |
| | Hassk; Dolichos biflorus | | | | | |
| | L | maize | | | | |
| | Zea mays L | | | | | |

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Ethiopian Standards Agency

## *Organization and Objectives*

The Ethiopian Standards Agency (ESA) is the national standards body of Ethiopia established in 2010 based on regulation No. 193/2010.ESA is established due to the restructuring of Quality and Standards Authority of Ethiopia (QSAE) which was established in 1970.

***ESA's objectives are:-***

- Develop Ethiopian standards and establish a system that enable to check weather goods and services are in compliance with the required standards,
- Facilitate the country's technology transfer through the use of standards,
- Develop national standards for local products and services so as to make them competitive in the international market.

## Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational Institutions, research institutes, government organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/ or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes.
Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices. A catalogue of Ethiopian Standards is also available freely and can be accessed in from our website.

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International Involvement
ESA, representing Ethiopia, is a member of the International Organization for Standardization (ISO), and Codex Alimentarius Commission (CODEX). It also maintains close working relations with the international Electro-technical Commission (IEC) and American Society for Testing and Materials (ASTM).It is a founding member of the African Regional Organization for standardization (ARSO).

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